SECTION 01815

HVAC COMMISSIONING PROCESSES

PART 1 - GENERAL

1.1 REFERENCES

1.2 RELATED REQUIREMENTS

1.2.1 The provisions of Section 01200, "Price and Payment Procedures" apply to this Section.

1.2.2 The provisions of Section 01810, " Commissioning Processes" apply to this Section.

1.2.3 The provisions of Section 11243, " Chemical Treatment of Water for Mechanical Systems" apply to this Section.

1.2.4 The provisions of Section 15070, "Mechanical Sound, Vibration and Seismic Control" apply to this Section.

1.2.5 The provisions of Section [**15901, "Space Temperature Control"**] [**15910, "Direct Digital Controls**] apply to this Section.

1.2.6 The provisions of Section 15950 "Testing/Adjusting/Balancing apply to this Section.

1.2.7 The provisions of Section 15991, "Inspection, Testing, and Certification of Boilers" apply to this Section.

1.3 DEFINITIONS

1.3.1 DALT: Duct air leakage test.

1.4 FIRST-TIER SUBCONTRACTORS' RESPONSIBILITIES

1.4.1 The following responsibilities are specific first-tier subcontractor responsibilities that are in addition to the general responsibilities specified in Section 01810, "General Commissioning Processes."

1.4.2 Mechanical Contractor's Responsibilities:

a) Require cooperation and schedule participation of subcontractors including, but not limited to, sheet metal, piping, refrigeration, and water treatment subcontractors, and suppliers of major equipment, in testing, adjusting, and balancing and Commissioning Team activities.

b) In collaboration with the Electrical Contractor, coordinate installation between and among life safety and HVAC systems.

c) Provide written notification two weeks in advance to the Construction Manager and Commissioning Authority when equipment and system startup and testing can be witnessed, when testing, adjusting, and balancing work is ready to begin, when testing, adjusting, and balancing verification testing can be witnessed, and when automatic temperature control system startup and testing can be witnessed.

d) Prior to initiating the testing, adjusting, and balancing work meet with the Owner, Commissioning Authority, Mechanical Contractor, HVAC design professional, and the Testing, Adjusting, and Balancing Contractor. The Testing, Adjusting, and Balancing Contractor shall present to and get concurrence of the testing, adjusting, and balancing procedures from the attendees of the meeting. Verify that the Testing, Adjusting, and Balancing Contractor has required forms for proper data collection.

e) Attend testing, adjusting, and balancing verification testing.

f) Demonstrate the operation of each piece of equipment to the Owner's operation and maintenance personnel and Commissioning Authority. Schedule subcontractors and equipment manufacturer's authorized service representatives as may apply to demonstrate the operation of the equipment and systems.

g) Supervise installations by subcontractors to include, but not limited to, the following:

(1) Compliance with manufacturers' installation instructions.

(2) Compliance with codes and standards.

(3) Successful completion of testing, including flushing, cleaning, pressure testing, and leakage testing

(4) System and equipment startup.

1.4.3 Automatic Temperature Controls Contractor's Responsibilities:

a) Review design for controllability with respect to selected manufacturers equipment;

(1) Verify proper hardware specification exists for functional performance required by specification and sequence of operation.

(2) Verify proper safeties and interlocks are included in design.

(3) Verify proper sizing of control valves and actuators based on design pressure drops. Verify control valve authority to control coil properly.

(4) Verify proper sizing of control dampers. Verify damper authority to control air stream. Verify proper damper positioning for mixing to prevent stratification. Verify actuator vs. damper sections for smooth operation.

(5) Verify proper selection of sensor ranges.

(6) Clarify questions of operational sequences.

b) Verify proper installation and performance of controls[**and BAS hardware and software**].

c) Integrate control system installation and programming schedule with construction and commissioning plan.

d) Train Owner's operations and maintenance personnel on hardware operations and programming[**and the application program for the system**].

e) Demonstrate system performance to Commissioning Authority including normal, abnormal, and emergency modes.

f) Participate in systems performance verification testing.

g) Support and coordinate with Testing, Adjusting, and Balancing contractor.

1.4.4 HVAC Testing, Adjusting, and Balancing Contractor's Responsibilities:

a) Review Contract Documents before developing testing, adjusting, and balancing procedures to verify the following:

(1) Accessibility of equipment and components, which will be required for testing, adjusting, and balancing work.

(2) Adequate number and placement of duct balancing dampers to afford effective balancing, while minimizing space sound levels.

(3) Adequate number and placement of flow control balancing valves to allow proper proportional balancing and recording of water flow.

(4) Adequate number and placement of test ports and test instrumentation to allow reading and compilation of equipment and system performance data needed to conduct both testing, adjusting, and balancing and Commissioning performance verification testing.

(5) Equilibrium of outlet air and water volume flow rates has been specified with compared to central equipment output capacities.

(6) Identify discontinuity of omission in Contract Documents.

(7) This review of Contract Document by the Testing, Adjusting, and Balancing Contractor satisfies the requirement of a Design Review Report as specified by Section 15950, "Testing/Adjusting/Balancing."

b) Submit the testing, adjusting, and balancing procedures to the Commissioning Authority and Design Professional for review and acceptance.

c) Attend the testing, adjusting, and balancing review meeting scheduled by the Commissioning Authority and present HVAC testing, adjusting and balancing procedures.

d) Participate in training sessions as scheduled by the Commissioning Authority.

e) the completion of the testing, adjusting, and balancing work, and submittal of final testing, adjusting, and balancing report, notify the Commissioning Authority, Mechanical Contractor and Design/Build Contractor.

1.4.5 Electrical Contractor's Responsibilities:

a) In collaboration with the Mechanical Contractor coordinate installation between and among life safety and HVAC systems.

b) Attend testing, adjusting, and balancing verification testing.

1.5 HVAC SYSTEM DESCRIPTION

1.5.1 Energy Supply Systems (oil, gas, coal, steam, hot water, and solar)

1.5.2 Heat Generation (boilers, feedwater equipment, furnaces, auxiliary equipment)

1.5.3 Refrigeration (chillers, cooling towers, refrigerant compressors and condensers, heat pumps, and other refrigeration systems)

1.5.4 HVAC Distribution (air, steam, and hydronic distribution systems, special exhaust, and other distribution systems)

1.5.5 HVAC Terminal and Package Units

1.5.6 HVAC Instrumentation and Controls (EMS, control equipment and devices, sequence of operations)

1.5.7 Testing, Adjusting, And Balancing Requirements

1.6 SUBMITTALS

1.6.1

1.7 QUALITY ASSURANCE

1.7.1

PART 2 - PRODUCTS

2.1

PART 3 - EXECUTION

3.1 TESTING PLAN

3.1.1 Large Boiler Testing and Acceptance Procedures: Commissioning Authority shall coordinate and attend boiler inspections and test and require the following attendance:

a) NAVFACENGCOM EFD or EFA Staff.

b) Qualified boiler inspector.

c) Mechanical Contractor.

d) D/B Contractor.

e) Quality Control Manager.

3.1.2 HVAC Control System Testing Plans: Field test plans and performance verification test plan requirements are specified in [**Section 15901N - Space Temperature Controls**] [**Section 15910 - Direct Digital Controls**]. The Commissioning Authority, D/B Contractor, and the Automatic Temperature Control Contractor shall collaborate to prepare field test and performance verification test plans.

a) Commissioning Authority and Automatic Temperature Control Contractor shall review control designs prepared by the DB-1 and provide comments for adjustments to control designs and sequence operation descriptions.

b) D/B Contractor will make required adjustments.

c) Automatic Temperature Control Contractor shall write field test and performance verification test plans.

3.1.3 Pipe Cleaning, Flushing, Hydrostatic Tests, and Chemical Treatment: The Commissioning Authority shall collaborate with Contractor QC to enforce execution of the plan by installers of piping systems. The Contractor QC and Mechanical Contractor shall prepare a pipe system cleaning, flushing, hydrostatic testing, and chemical treating plan. The plan shall include the following:

a) Sequence of testing and testing procedures for each section of pipe to be tested identified by pipe zone or sector identification marker. Markers shall be keyed to a drawing for each pipe sector showing the physical location of each designated pipe test section. The drawing keyed to pipe zone or sector shall be formatted to allow each section of piping to be physically located and identified when referred to in the pipe

system cleaning, flushing, hydrostatic testing, and chemical treating plan.

b) Description of filtration and equipment for flushing operations. Project installed pumps shall not be used for flushing operations.

c) Minimum flushing water velocity.

d) Tracking checklist for managing and ensuring that all pipe sections have been cleaned, flushed, hydrostatically tested, and chemically treated.

3.2 Testing, Adjusting, and Balancing

3.2.1 Ductwork Testing: The Government will identify, for the Contractor QC and the Commissioning Authority, portions of duct systems to have DALT. DALT shall be performed according to Section 15950 - Testing/Adjusting/Balancing by TABS Contractor and witnessed by the Contractor QC and the Commissioning Authority.

a) On approval of preliminary DALT report the Commissioning Authority shall coordinate verification testing of DALT with appropriate members of the Commissioning Team present. Verification testing shall include random retests of portions of duct section tests, reported in the Preliminary DALT Report. The Commissioning Authority, [**Government,**] Contractor QC, TABSA Contractor, Sheet Metal Contractor, and other entities invited by the Commissioning Authority shall attend and witness verification testing.

3.3 <**INSERT ARTICLE TITLE**>

END OF SECTION 01815